Boron Neutron Capture Therapy (BNCT) is an emerging innovative cancer treatment. BNCT’s advantage is its selectivity to cancer cells. Its efficacy depends on higher boron concentrations in tumor than normal cells and neutron beam energy characteristics. Technological advancements in neutron sources has shifted reliance from nuclear reactors towards accelerator-based neutron sources, allowing for accessible and feasible study of BNCT. BNCT has been studied in glioblastoma, head & neck cancer, melanoma, and meningioma, with previous/ongoing studies suggesting promising results. Japan became the 1st country to gain approval for clinical use of BNCT for recurrent head & neck cancers in 2020. There is a need for large-scale clinical trials to support evidence-based clinical application of BNCT. There are ongoing efforts to develop an accelerator-based BNCT (AB-BNCT) center in a Canadian hospital: Canada Foundation for Innovation (CFI) 2023 Innovation Fund. However, it remains unclear how Canadian radiation oncologists (RO), medical physicists (MP), and their residents perceive BNCT.

**Objectives**

1. To study Canadian RO, MP, and their residents' knowledge of BNCT.
2. To gather RO/MP’s interest in initiating BNCT research.
3. To examine and recognize BNCT’s potential clinical applications.

**Methods**

1. A literature review was conducted.
2. Survey distribution was during January-May 2022 via 2 national organizations: Canadian Association of Radiation Oncology (CARO) and Canadian Organization of Medical Physicists (COMP).
3. The survey was approved by the Windsor Regional Hospital Research Ethics Board as well as the board of Directors of both CARO and COMP.
4. Data was analyzed using descriptive statistics.

**Results**

Current Knowledge of BNCT (MP vs RO)

- **118 valid responses** from all 10 provinces in Canada.
- **Majority** from Ontario (46%) followed by Quebec (19%) (N= 22).
- **70 RO (59%)**, **48 MP (41%)**, including 9 residents.

**Conclusions**

- With recent technological advancements in accelerators, there is renewed global interest in BNCT research.
- Most Canadian radiation oncologists and medical physicists are aware of BNCT, support Canadian research efforts, and recognize the possible applications of BNCT.
- However, a large subset of physicians would benefit from education surrounding BNCT development and applications.

**Discussion**

- **Awareness of BNCT**
  - **30%** correctly identified Japan as the 1st country to approve AB-BNCT for routine use in head & neck cancer in 2020.
  - **8%** correctly recognized ~20 BNCT facilities being built globally (2021).
  - **5%** correctly recognized that 20 countries sent representatives to attend the last BNCT Technical Meeting at IKEA to update the BNCT guideline book in 2020.

- **Opinions on Joining BNCT Global Research & Clinical Applications**
  - **30%** believe Canada join global research efforts towards approving BNCT as a clinical technique.
  - **53%** believe Canada join global research efforts towards approving BNCT as a clinical technique.
  - **17%** believe Canada join global research efforts towards approving BNCT as a clinical technique.

- **Additional Comments (Optional)**
  - **Limited awareness:** "I know next to nothing about BNCT. It would be great to see some talks on the subject at the next COMP meeting.”
  - **Considerations:** "This will require institutions [capable of] large scale clinical trials support, such as those located in regions of large patient populations.”

- **Hesitations:**
  - "I’m worried about investing time and effort in developing a technique that hasn’t received substantial uptake despite decades of existence”
  - "I am prepared to keep an open mind, but I would need convincing to put research dollars into this enterprise”

- **Enthusiasm:**
  - "I think we should move forward with BNCT, often the introduction of a new technique serves as a catalyst for new discoveries”
  - "We have knowledge, the resources, and clinical science background. We should move forward”

**Perceptions on Reasons of Unsuccessful Early BNCT Studies Between 1950s-2000 in Nuclear Reactors**

- **Hypothetical cases of recurrent & unresectable tumors following maximal dose chemoradiation**
- **Out of 7 listed treatment options, BNCT was the 6th most rated option** for glioblastoma (17%; N=12), meningioma (16%; N=11), and melanoma cancers (16%; N=11).
- For head and neck cancers, BNCT was the least popular option (19%; N= 13).

**Acknowledgments**

1. **Knowledge of BNCT:**
   - Despite some awareness (60% total), many RO (44%) don’t know about BNCT.
   - Despite 49% RO and 38% MP not knowing reasons for lack of BNCT progress, many believe it’s most attributable to limited trials due to neutron source inaccessibility (42%) and infrastructure unsuitability (35%).

2. **Limited awareness (5-30%) of recent BNCT global developments**

3. **BNCT’s potential clinical applications in Canada:**
   - Recognition of BNCT as a possible recommended treatment (16-19% of RO).
   - 57% of RO/MP willing to refer or recommend BNCT.

*For details please visit: https://doi.org/10.3390/cancers15143626"